Reviewer's report

Title: Comparing super-rigid braces effectiveness. ART vs Sforzesco (SPoRT) brace: a matched case-control multicentre short-term study according to the SOSORT-SRS recommendations

Version: 2
Date: 6 June 2015
Reviewer: Manuel Rigo

Reviewer's report:

General comment:

This is an interesting paper comparing two similar brace concepts. Main similarity is the super-rigidness, while main difference according to author's description is the external symmetry in the Sforzesco Brace concept compared with the external asymmetry in the ART concept. Accepting the limitation of a small sample, results show that both brace concepts work in a similar way in terms of in-brace correction and short-term clinical results (Cobb angle and ATI). The paper is well written and follows strictly all the recommended steps to write a scientific paper. Methodology is correct and limitations of the study are pointed out by the authors and well discussed. According to limitations, the authors conclude:

'Radiographic results at very short and short term were similar for the ART and Sforzesco Brace. Further studies with end growth results are needed to confirm these preliminary data. Sagittal profile assessment, aesthetic changes and quality of life measurement are to be included for a more complete and patient oriented evaluation of the treatment effects.'

Looking at the methodology section, reported results and such a conclusion, the paper would look like a classical case-control study where a new 'concept' – the case- is compared with an already classical 'concept' – the control. The ART would represent the new concept and the Sforzesco would represent the classical concept. Everything correct until here, however, reading carefully the discussion section this reviewer has the subjective perception that the authors are not only defending the classical concept but trying to slip trough a hidden idea: 'asymmetric envelope is not better than symmetric envelope'. Although, obviously this is not the conclusion offered by the authors and the findings are well interpreted and perfectly quoted in its context (curves over 40° in quite mature patients, where in-brace correction is not so determinant in defining end results), this general idea is not properly denied by the authors and the paper like it is could still be used by somebody in the future to spread this general idea. The authors write:

'In fact, we have found the marked asymmetry of the envelope could possibly be useful to reach a slightly better in brace correction, but this difference is not
statistically significant nor clinically relevant, and it is in any case reduced at short
time out of brace comparison. Some of the most used modern braces like the
Rigo-Cheneau Brace base their action in the marked envelop asymmetry that
warrant an asymmetrical in brace posture to revert the curve [25]. On the
contrary, the SPoRT concept of bracing is based on an almost symmetric
envelop with pushed acting inside the brace to exert higher forces on the trunk
and creating a lower degree asymmetry [17]. In brace correction has been
always considered as a key point for scoliosis treatment, with studies
demonstrating that a high percentage of correction is needed to achieve good
results. These studies have been performed in lower degree curves, up to
30-35°; being our curves much larger, up to 60° Cobb: a percentage comparison
in not correct, since higher curves have higher rigidity and presumably reduced
inbrace correction. Nevertheless, it’s interesting to notice that an overall good
correction, even if lower than in other cases, didn’t affect at least six months
results. We can assume that at least for super-rigid braces the in brace
correction is only partially predictive, as already showed [26].’

I would suggest the authors to clearly state that the results of the study show that
‘asymmetric brace is not better than symmetric brace’ but just in this context and
with the already discussed limitations but not in a general context. On the other
hand, I disagree with the term ‘marked asymmetry of the envelope’. This is from
the perspective of clinicians that have been using traditionally symmetric braces.
From one side it is logical that Dr. Jean Claude de Mauroy, as an expertise
clinician performing EDF cast for many years, would have thought about both,
asymmetric and super-rigid envelope to substitute the plaster cast, because as a
part of the EDF procedure the cast is fixed once the patient has been brought
into the best possible correction. In my experience, independently of the material,
the really ‘market asymmetric envelop’ use by some Chêneau type braces and
derivatives, can convert a no so rigid material, if the brace is quasi-symmetric or
lightly asymmetric, also in a like super-rigid material. Looking at the ART brace
from the perspective of a clinician using from many years asymmetric braces I
would subjectively define the ART as a lightly asymmetric brace, needing of
course of a material and construction that make it rigid enough to be able to
control curves over 40º in substitution of the cast. You call this super-rigid brace
(Figure 1). Although, again this is quite subjective, I agree about using this term,
but I do not agree about describing the ART as a ‘marked asymmetric envelope’.
Looking at the higher although not statistically significant difference in-brace
correction obtained by the ART, one could discuss that, as the authors already
discuss, with a bigger sample results could be different, but I could also add that
may be the brace was not asymmetric enough to make a difference on this. In
any case, I agree that even with a higher in-brace correction, short and long-term
end results looking at the Cobb angle could be not different, because the
relationship between in-brace correction and end results exist also in relation with
the potential of growth and can be observed basically when treating more
immature patients. Also, a higher in-brace correction of the Cobb angle in rigid
curves of quite mature patients can-not be expected unless producing wrong
compensations in the same plane of the correction (frontal plane when looking at
the Cobb angle) or in different planes (increasing of the flat back). Thus, although
the asymmetric brace could produce in this case some more correction, this could be not significant even for a bigger sample. But the main point is that the asymmetric aspect of the envelope is produced by to different principles of construction. One is the more or less increased axial distance in locating in the space the pads to produce detorsional effect. The other one is the higher or lower definition of the shape and orientation of the contact areas in contrast with the expansion areas. The first principle is essential to achieve a better short term in-brace correction in flexible, mild to moderate curves, while the second principle is essential not so much in the correction of the Cobb angle but in producing a body reaction, from breathing mechanics and growth, which is related to a medium and long term re-shaping effect of the trunk (nothing related with the Cobb angle). It is true that the results at six months show that the ART brace is not reducing more the ATI than the Sforzesco Brace. This could be still a sign that both concepts — symmetric and asymmetric envelope— work the same but could be also a sign that the asymmetric envelope – ART Brace- is not symmetric enough to make a difference, while other more asymmetric braces could be.

A final comment is that the whole discussion section looks written basically in defense of the ‘control -Sforzesco’ in front of the ‘case- ART’, something logical as the main and two more authors are using Sforzesco Brace, but the inventor of the ART is also author of this paper and this reviewer has the perception that the second author and promoter of the ART Brace concept has taken a quite passive and negatively biased position in defense of his own concept.

Summarizing,

No major compulsory revisions:

The scientific quality of the paper is not discussed and this reviewer cannot indicate any major compulsory revision. But from my personal perception the discussion section shows some subtle bias.

Minor essential revisions:

The term ‘marked asymmetry’ defining ART is not accepted by this reviewer because it is a relative term -please read the general comment-. In this direction I would also suggest to leave the term ‘dramatically’ from the first sentence in the Introduction section. I suggest using ‘significantly’.

Discretionary revisions:

In base of my above general comment and as discretionary revision, I suggest the authors to more clearly state that this paper is not a paper to compare symmetric and asymmetric concepts but just two super-rigid braces, one using symmetric envelope and another using an envelope with certain degree of asymmetry in high moderate rigid-curves and quite mature patients (Mean Risser 2).

Table 1 (database) shows the Risser sign stratified from 0 to 4 or more. Table 3
could also show Risser sign stratified from 0 to 4 or more. To show the first sub-group 0-2 (when the mean Risser is 2) is not helping to understand that this study is based in a sample of quite mature patients.

First page: In University is missing ‘r’

Some figure showing the radiograph in-brace correction and result at six month, for both concepts, would enrich the paper with no doubt.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

Receipt of honoraria or consultation fees as medical advisor of Ortholutions oHG